REMARKS

Claims 1-38 are pending. New claims 36-38 are added herein.

I. Overview of the Office Action

Claims 1-17, 19-20,25-28 and 31-34 stand rejected as anticipated under 35 U.S.C. §102 by West (WO 98/25401). The remaining claims, 18, 21-24, 29-30 and 35 stand rejected as obvious under 35 U.S.C. §103 in view of a combination of West with Hirao et al. (U.S. Patent No. 4,996,596).

II. The anticipation rejections of independent claims 1 and 19

The following summary is based on the specification and is provided for the convenience of the Examiner and not to argue limitations which are unclaimed.

The invention relates to a method and a device for correcting the phase between the pixel clock of a graphics card and the sampling clock of a flat-panel display with an analog interface in a system comprising a flat-panel display, a graphics card and a computer.

Flat-panel displays with an analog interface must be adapted to the graphics card of the connected computer. If phase or sampling frequency is incorrectly adjusted, the image appears fuzzy and contains interferences. Whereas the values for image location, or in other words right-left and top-bottom adjustment, and for sampling frequency can be defined as preadjusted values in the case of standard modes, this is not possible for the phase, since the phase depends on the graphics card used and also on the video circuit.

The adjustment of the sampling clock and of the phase have a direct effect on image quality. An optimal sampling frequency is achieved when the sampling of all pixels, in one line

of a video signal, for example, takes place in a stable or characteristic region of these pixels, such as at the center of each pixel. Data conversion then yields optimal results. The displayed image does not contain any interferences, and is stable. In other words, the optimal sampling frequency is equal to the pixel frequency.

Even in cases in which the sampling clock is identical to the pixel clock, however, the image quality can suffer if the phase has not been adjusted correctly. The reason is that sampling takes place in a pixel region that is not ideally suitable for sampling, for example too close to the leading or trailing edge of a pixel. This problem can be solved by shifting the phase, or in other words the sampling instant, until sampling takes place in a characteristic or permissible region of the pixels. If the phase has not been adjusted correctly, the image quality is impaired by noise signals over the entire monitor.

For satisfactory operation of the flat-panel display, it is also desired that the phase adjustment be stable even over the long term. Among analog interfaces, it is known that the analog interface is not 100% stable. For example, run times and other characteristics vary with temperature. This instability of the analog interface also affects the image quality of the flat-panel display. In other words, even if the sampling phase is correctly adjusted when the computer is turned on, after a certain time, such as 30 minutes, the phase has undergone a drift which then leads to a reduction of image quality and also, in many cases, to questions via the supplier's hotline.

West WO 98/25401

The anticipation rejections are respectfully overcome as West WO 98/25401 does not perform any correction of the phase difference between a pixel clock of a graphics card and a

sampling clock of a flat panel-display after an initial set-up period. In other words, once the display in West is initially checked and set-up (so that E=W) and a desired resolution is set, the settings are not rechecked during the continued operation of the display. Therefore, as the analog interface heats up and temperature induced "phase drift" occurs, West cannot compensate for this phase drift because West does not make repeated phase adjustments during "continued operation" as claimed in present independent claims 1 and 19.

Independent claims 1 and 19 have been amended. No new matter is added. Support is discussed and pointed-out below.

Claim 1 now claims:

1. (currently amended) A method for correcting the phase difference between ~~the~~ a pixel clock of a graphics card and ~~the~~ a sampling clock of a flat-panel display with an analog interface in a system ~~comprising~~ having a flat-panel display, a graphics card and a computer, ~~characterized in that~~ comprising:

determining an optimal phase difference between the pixel clock of the graphics card and the sampling clock of the flat panel display; and

performing an automatic adjustment of the optimal phase difference ~~is performed~~ repeatedly during continued operation of the display to compensate for phase drift during the continued operation of the display by providing an updated optimal phase difference.

Support for these amendments is found in the preamble of originally filed claim 1, and in the specification ***(see emphasized terms below)***. For example, at the bottom of page 1, it is stated that "The adjustment of the sampling clock and the phase have a direct effect on image quality. ***An optimal*** sampling frequency is achieved when the sampling of all pixels, in one line of video signal, for example takes place in a stable or characteristic region of these pixels, such as the center of each pixel." Additionally, at the bottom of page 20, operational steps are listed, i.e., "3. Repeat steps 1 + 2 until ***the ideal phase*** for output 1 has been determined." Also, see page 21, "6. repeat steps 4 + 5 until ***the ideal phase*** for output 2 has been determined," and at page

21, see "Repeat steps 4 through 9 ***cyclically***." "Cyclically" which is defined as "revolving or recurring in cycles," along with other phrases, supports the terms "continued operation" as does the language "***continuously correct adjustment of the phase***" from page 3 quoted below.

Additionally, at page 3 it is stated that:

> "For satisfactory operation of the flat-panel display, it is also desired that the phase adjustment be stable even over the long term. Among analog interfaces, it is known that the analog interface is not 100% stable. For example, run times and other characteristics ***vary with temperature***. This instability of the analog interface also affects the image quality of the flat-panel display. In other words, even if the sampling phase is correctly adjusted when the computer is turned on, after a certain time, such as 30 minutes, ***the phase had undergone a drift***, which then leads to a reduction of image quality...
>
> In this regard, the object of the invention is to provide a method and a device for correcting the phase in flat-panel displays, ***whereby a continuously correct adjustment of the phase*** is possible."

Furthermore, it is stated at page 12, line 13, that: "By virtue of a delay time caused in the phase locked loop PLL, ***a phase difference*** is established between pixel clock and sampling frequency." Also see, page 13, line 17, wherein it is stated that: "the phase of the pixel clock must be shifted in order to determine ***the most favorable*** of the phase positions." Additional support is found at page 13, i.e.,

> "Figure 3 shows how the information on phase position that is indispensable for closed-loop control is obtained by determining ***the optimal*** sampling instant for shifting the phase. If the phase is ***determined continuously*** and determination of phase... "

Thus it is respectfully asserted that the amendments include no new matter.

West, WO 98/25401 does not anticipate independent claims 1 and 19.

West, WO 98/25401 has been reviewed in detail.

In contrast to claim 1 above, the cited reference -- as best seen in Fig. 6B -- ***stops all further adjustments once "expected image width E " equals the "actual image width W."*** At reference numeral 174, for example, W=640 and the resolution was already set at 640 x 480 initially, so no adjustment is needed according to West. ***Significantly, then the method of West is ended and the adjustment of the settings is over.*** (See page 15 of West, at line 20, "Thus, the phase is set... ") Therefore, it is respectfully noted that there is no disclosure or suggestion in West of "performing an automatic adjustment of the optimal phase difference ***repeatedly during continued operation*** of the display to compensate for phase drift during the continued operation of the display by providing an updated optimal phase difference" as claimed in present claims 1 and 19.

Therefore, significantly, the problem of a CPU or interface heating up and producing a phase drift cannot be compensated for in West. Clearly, as described in the Background of the present invention, this is a difference that matters.

Independent method claim 19 has been amended in a similar fashion and the arguments discussed above also apply to claim 19. Additionally, a processor and adjusting circuit have been specifically recited and are supported at least by Figures 1 and 8. Therefore, claim 19 is also respectfully asserted to be allowable.

The remaining claims, which are all dependent, are therefore also allowable.

Minor formatting amendments have also been made to the dependent claims.

II. The obviousness rejections of dependent claims 18, 21-24, 29-30, and 35 in view of the combination of West and Hirao, are respectfully overcome in view of the amendments to independent claims 1 and 19.

The deficiencies of West have been addressed above in regard to independent claims 1 and 19, including that it does not perform an adjustment after an initial set up period. Additionally, claims 1 and 19 have been amended to claim "performing an automatic adjustment of the optimal phase difference repeatedly during continued operation of the display to compensate for phase drift during the continued operation of the display by providing an updated optimal phase difference." Hirao does not make up for the deficiencies of West in regard to the independent claims or teach or suggest the limitations above. For example, Hirao does not discuss the issue of phase drift due to temperature changes in an analog interface. Therefore, the combination of all of the limitations of independent claims 1 and 19 is not taught or suggested by the combination of references. Thus, the obviousness rejections are respectfully overcome as a *prima facie* case of obviousness as required by 35 U.S.C. §103 (see also MPEP 706.02(j)) has not been established by the combination of references as required.

III. Dependent claims

The dependent claims serve to even more clearly distinguish the present invention over the applied references. For example, claim 20 recites that the automatic adjustment of the optimal phase difference is performed continuously or periodically. Claim 26 recites that the adjusting circuit determines the rising edge of a video pulse of a sufficiently bright image spot, determines the falling edge of the video pulse at a sufficiently bright image spot, and the phase is

such that the sampling instant is located at approximately the midpoint between the rising and the falling edges of a video pulse.

IV. New claims 36-38 have been added.

Claim 36 is supported by the specification at page 21.

Claim 37 is a based on a combination of claim 1 and the disclosure found at page 4 last paragraph to page 5, first paragraph.

Claim 38 is based on a combination of claims 1 and 4.

V. Conclusion

Based on all of the above, it is respectfully submitted that the present application is now in proper condition for allowance. Prompt and favorable action to this effect and early passing of this application to issue are respectfully solicited.

Should the Examiner have any comments, questions, suggestions or objections, the Examiner is respectfully requested to telephone the undersigned in order to facilitate reaching a resolution of any outstanding issues.

It is believed that no fees or charges are required at this time in connection with the present application. However, if any fees or charges are required at this time, they may be charged to our Patent and Trademark Office Deposit Account No. 03-2412.

Please note that the correspondence address has changed. Please check that the address is correctly recorded at the USPTO.

Respectfully submitted,

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